International Journal of Research in Engineering, Science and Management
Volume-2, Issue-5, May-2019
www.ijresm.com | ISSN (Online): 2581-5792


# Modernization of Conventional Multi Operation Machine with Special Attachment

S. Vignesh[1], K. Vijay[2], G. Periasamy[3], D. Santhosh Kumar[4]
[1]*Assistant Professor, Dept. of Mechanical Engineering, Sri Eshwar College of Engineering, Coimbatore, India*
[2,3,4]*UG Student, Dept. of Mechanical Engineering, Sri Eshwar College of Engineering, Coimbatore, India*

***Abstract*: This paper talks about the traditional machine into CNC machine by actualizing a delicate figuring technique. In the present situation machine assumes an indispensable job in assembling industry and it is efficient, the precision and effectiveness are not up to the dimension. Then again, CNC machine give the ideal precise measurement and productivity, yet its enormous in capital expense. To beat this circumstance, a semi-mechanized methodology towards the ordinary machine is created by utilizing DC engines. That can be constrained by Arduino UNO-microcontroller. The information parameters of the activities the Arduino coding is been produced and exchanged to the UNO board. In the mechanical section, a plan is made to feed the dc motor to the lead screw. On the other hand, in the electronic section, an electronic circuit containing the motor driver circuit is structured so as to control and record the axis movement.**

***Keywords*: lathe, CNC machine, Arduino Microcontroller**

## 1. Introduction

The work is aimed at development of converting conventional lathe machine into smart machine with help of controller or Arduino and motor, motor drives [1]. Lathe machines have been called the mother of machines since they can almost machine any type of component or materials [3]. they have become the ancestral machine which mankind have been used for many advancements and in industries but now they have been overcome with numerical controlled machine which are again revolutionized into CNC which provide high degree of accuracy and precision but their cost are too much for many small scale industries [6] and more over the operators must learn the G-codes and M-codes which are used to control any typical CNC machines[2]. Thus our project is convert a lathe machine in to smart while where the operator can record the memory codes which are calculated by the controller itself and can be repeated multiple number of times with of repeat and record buttons [15]. In this project we have controlled the lathe machine with Arduino controller and motor drivers and record repeat button which helps to save the memory codes of the movements of lead screw and the carriage movement by the bolt and nut mechanism. The motors are connected to the lead screw and the carriage with help of motor drivers which controls the rotation of the motors and provide accurate position for the complete achievement of the accuracy and precision of carriage and the lead screw movement [16].

The arduino board controls the entire operation just by feedback mechanism from the motor drivers and controls their rotation and also controls the record and repeat options [14], which makes the lathe machine into smart machine thus allowing the machine to run continuously for many repeated cycles which makes the machine best suited for batch production in small scale industries.

## 2. Experimental setup and details

### *A. Experiment setup*

In this venture an endeavor has been made to prepare the regular machine with Digital Intelligence framework (DIS). In order to get more accurate dimensions and easier programming for the operator. There will record button pressing which will record all the action done on the lathe. Upon pressing repeat button, the recorded actions will be repeated just like a CNC machine.

Fig. 1. Experimental setup

### *B. Experimental details*

- DC motor
- Motor module
- Keypad
- Arduino UNO
- Lead screw
- EEPROM

### C. *Arduino UNO*

A microcontroller is a little, ordinarily single chip. PC with the capacity to lead outerflags and react to them. The standard way a microcontroller interfaces with the outside world is through info/yield pins. Microcontrollers should likewise have some interface for programming them as memory to store the projects and to give transitory memory space to program execution.

The Arduino UNO has 14 input/yield sticks on one side (marked 0 through 13) and 6 input/yield sticks on the other (named A0 through A5). It is these pins that permit outside data stream all through the microcontroller. The six pins marked A0 through A5 have the simple to computerized transformation (ADC) capacity. This implies you can gauge a simple voltage (somewhere in the range of 0 and 5V) on these pinsto a specific level of exactness. On account of the Arduino, the exactness is 5/1023 or around 5 mV.

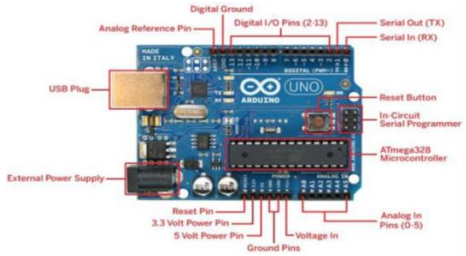


Fig. 2. Arduino UNO

Table 1
Electrical specifications of Arduino

| | |
|---|---|
| microcontroller | AT mega328P |
| Operating voltage | 5V |
| Input voltage (recommended) | 7-12 V |
| Input voltage(limit) | 6-20V |
| Digital I/O Pins | 14(of which 6 Provide PWN output) |
| Analog Input Pins | 6 |
| PWM Digital I/O Pins | 6 |
| DC Current for 3.3V Pin | 50mA |
| Weight of Arduino | 25g |
| Width | 53.4mm |
| Length of Aurdino | 68.6mm |
| Clock speed | 16MHz |
| Electrically Erasable Programmable Read Only Memory (EEPROM) | 1KB (AT mega 328P) |
| SRAM | 2KB |
| Flash Memory | 32KB |

### A. *Working*

When the operator presses the record button while operating the lathe machine the Arduino controller receives the codes for the precise location of the movement of the tool post and the carriage and saves it in the memory and when the codes are stored. They can be repeated by the push of the repeat button. when the operator presses the repeat button, the Arduino controller access the memory codes for the precise location of the carriage and tool post movement by controlling motor rotation with help of motor module which continuously sends feedback to the controller and thus the carriage and tool post movements are controlled in sequence for the perfect matching of the protect. The operator can repeat the same procedure for many number of identical product to be machined with the same identical dimension. Thus helping in batch production

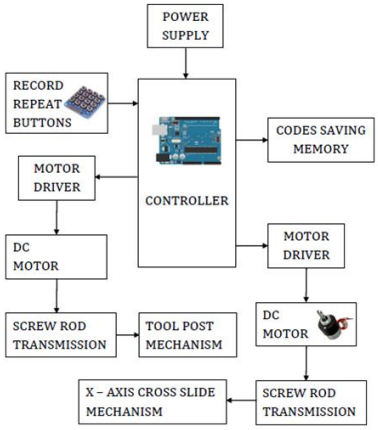


Fig. 3. Basic connection diagram

## 3. Conclusion

The task "Modernization of Conventional Multi Operation Machine with Special Attachment' which utilizes the Arduino is working with attractive condition to meet the resistances and furthermore the nature of the project. Thus this is useful to improve the exactness and accuracy of the parts to be machined in ordinary machine. This is only a model of the undertaking which can be tried adversary continuous ecological issues and other application.

## References

[1] Prakash N. Parmar, Vikas R. Gondalia, Niraj C. Mehta, “Review on advance automation of conventional lathe machine”, 2014.
[2] M. Minhat. S. B. Mohamed, M. J. Kadhim, M. A. Sulaima and M. S. Kasim “Retrofitting A conventional lathe to digital intelligence system”.
[3] Zin Ei Win. Than Naing Win. Jr., and seine lei winn (2008).”Design of hydraulic circuit for CNC lathe machine converted from conventional lathe machine”. World Academy of science. Engineering and technology. 2.380-384.
[4] Nollet, F., Floquet, T. and Perruquetti, W. (2008), “Observer-based Second Order Sliding Mode Control Laws for Stepper Motors”, Control Engineering Practice, 16 (4), 429-443.
[5] Akshay R Sonawane, Arun Bhiva Rane and D. S. S. Sudhakar, “Development of A3-Axis Cnc Milling Machine With An Open Source Controller”, IJRET, Aug-2017.
[6] S. Vigneshrao, “Design of 3-Axis Computer Numerical Control (Cnc) Router Using Stepper Motor”, International Journal of Global Engineering (IJGE), Vol.1, Issue 3, March-2017.
[7] Kulkarni Bharat P, “Arduino Based 3 axis PCB Drilling Machine”, International Journal of Emerging Technologies in Engineering Research (IJETER). Vol. 4, Issue 6, June (2016).
[8] Jahnavi Madireddy, "Importance of Lathe Machine in Engineering Field and its usage", GlobalJournal of Researches in Engineering: A Mechanical and Mechanics Engineering, Vol. 14, Issue 6, Year 2014,
[9] Sundar Pandian and S. Raj Pandian, “A Low-Cost Build-Your-Own Three Axis Cnc MillPrototype”, International Journal on Mechanical Engineering and Robotics (IJMER), ISSN(Print): 2321-5747, Vol.2, Issue-1, 2014.
[10] Enchev, M., 2004. “Managing the efficiency of automatic inspection on CNC lathes,” 4th International congress on manufacturing technologies. Varna, Bulgaria, pp. 80-84.

[11] Georgiev, V., Salapateva, S., Chetrokov, I., 2005. “The possibilities of increasing the accuracy of active inspection of CNC lathes using adaptive accuracy control,” AMTECH 2005. Rousse, Bulgaria, pp 386-391
[12] V.K. Pabolu and K.N.H. Srinivas, "Design and implementation of a three dimensional CNC machine", Int. J. Computer Science and Engineering, vol. 2, pp. 2567-2570, 2010.
[13] I. Nae and T. Andrei, "Designing and building a CNC router using stepper motors", Seria Technica, vo. LXII, pp. 55-62, 2010.
[14] F. Justin Dhiraviam, V. NaveenPrabhu, T. Suresh, andC. Selva Senthil Prabhu, “Improved Efficiency in Engine Cooling System by Repositioning of Turbo Inter Cooler,” Applied Mechanics and Materials, vol. 787, (2015), pp. 792–796
[15] V. Naveen Prabhu and M. Suresh, "Performance evaluation of tube-in-tube heat exchanger using nanofluids", Applied Mechanics and Materials, vol. 787, (2015), pp. 72–76.
[16] V. Naveen Prabhu, K. Saravana Kumar, T. Suresh and M. Suresh," Experimental investigation on tube-in-tube heat exchanger using nanofluids", Advances in Natural and Applied Sciences, Vol 10(7), (2016), pp. 272-278.
[17] N. Manigandan, V. Naveen Prabhu and M. Deva Kumar, “Design and Fabrication of Mechanical device for Effective Degreasing in Roller Bearing” Science Direct-Procedia Engineering, 97 (2014), pp. 134–140.
[18] N Manigandan, V NaveenPrabhu and M Suresh, “Experimental Investigation of a Brazed Chevron Type Plate Heat Exchanger “, International Journal of Science Technology & Engineering, Vol. 1 (12), (2015), pp.1-7
[19] V. Naveen Prabhu and N. Manigandan, “Design and Fabrication of Solar Transport Vehicle” IOSR Journal of Mechanical and Civil Engineering,pp.14-19.
[20] Y. Sureshbabu and P. Ashoka Varthanan, Study the emission characteristics of catalytic coated piston and combustion chamber of a four stroke spark ignition (SI) engine, Journal of Chemical and Pharmaceutical Sciences, JCHPS Special Issue 4: December 2014, pp-126-127.
[21] Venkatesh, S., Sakthivel, M., Sudhagar, S., & Daniel, S. A. A. (2018). Modification of the cyclone separator geometry for improving the performance using Taguchi and CFD approach. Particulate Science and Technology, 1-10.
[22] Jeyakumar, R., Sampath, P. S., Ramamoorthi, R., & Ramakrishnan, T. (2017). Structural, morphological and mechanical behaviour of glass fibre reinforced epoxy nanoclay composites. The International Journal of Advanced Manufacturing Technology, 93(1-4), 527-535.
[23] Palanivelrajan, A. R., & Anbarasu, G. (2016). Experimental Investigation of Performance and Emission Characteristics of Cebia petandra Biodiesel in CI Engine. International Journal of ChemTech Research, 9(4), 230-238.
[24] Venkatesha, S., & Sakthivelb, M. (2017). Numerical investigation and optimization for performance analysis in Venturi inlet cyclone separator. desalination and water treatment, 90, 168-179.
[25] Ramakrishnan, T., & Sampath, P. S. (2017). Dry Sliding Wear Characteristics of New Short Agave Angustifolia Marginata (AAM) Fiber-Reinforced Polymer Matrix Composite Material. Journal of Biobased Materials and Bioenergy, 11(5), 391-399.
[26] Thirumalaisamy, R., & Pavayee Subramani, S. (2018). Investigation of Physico-Mechanical and Moisture Absorption Characteristics of Raw and Alkali Treated New Agave Angustifolia Marginata (AAM) Fiber. Materials Science, 24(1), 53-58.
[27] Kumar, R. S., Alexis, J., & Thangarasu, V. S. (2017). Optimization of high speed CNC end milling process of BSL 168 Aluminium composite for aeronautical applications. Transactions of the Canadian Society for Mechanical Engineering, 41(4), 609-625.
[28] Thirumalaisamy, R. (2017). Experimental investigation of mechanical properties of untreated new agave angustifolia marginata fiber reinforced epoxy polymer matrix bio-composite material. Journal of advances in chemistry, 13(4), 6120-6126.
[29] Ramakrishnan, T., Sampath, P. S., & Ramamoorthi, R. (2016). Investigation of Mechanical Properties and Morphological Study of the Alkali Treated Agave Angustifolia Marginata Fiber Reinforced Epoxy Polymer Composites. Asian Journal of Research in Social Sciences and Humanities, 6(9), 461-472.
[30] Kumar, S. R., Alexis, J. S., & Thangarasu, V. S. (2017). Experimental Investigation of Influential Parameters in High Speed Machining of AMS 4205. Asian Journal of Research in Social Sciences and Humanities, 7(2), 508-523.
[31] Subramaniam, B., Natarajan, B., Kaliyaperumal, B., & Chelladurai, S. J. S. (2018). Investigation on mechanical properties of aluminium 7075-boron carbide-coconut shell fly ash reinforced hybrid metal matrix composites. China Foundry, 15(6), 449-456.
[32] Balasubramani, S., & Balaji, N. (2016). Investigations of vision inspection method for surface defects in image processing techniques-a review. Advances in Natural and Applied Sciences, 10(6 SE), 115-120.
[33] Bala Subramani, S., Dhana Balakrishnan K.P., Balaji, N. (2015) Optimization of Machining parameters in Aluminium HMMC using Response Surface Methodology. International journal of applied engineering research, 10(20), 19736-19739.
[34] Kumar, R. S., Thangarasu, V. S., & Alexis, S. J. (2016). Adaptive control systems in CNC machining processes--a review. Advances in Natural and Applied Sciences, 10(6 SE), 120-130.
[35] Ramakrishnan, T., Sathish, K., Sampath, P. S., & Anandkumar, S. (2016). Experimental investigation and optimization of surface roughness of AISI 52100 alloy steel material by using Taguchi method. Advances in Natural and Applied Sciences, 10(6 SE), 130-138.
[36] Sathish, K., Ramakrishnan, T., & Sathishkumar, S. (2016). Optimization of turning parameters to improve surface finish of 16 Mn Cr 5 material. Advances in Natural and Applied Sciences, 10(6 SE), 151-157.
[37] Kumar, S., Alexis, J., & Thangarasu, V. S. (2016). Prediction of machining parameters for A91060 in end milling. Advances in Natural and Applied Sciences, 10(6 SE), 157-164.
[38] NaveenPrabhu, V., SaravanaKumar, K., Suresh, T., & Suresh, M. (2016). Experimental investigation on tube-in-tube heat exchanger using nanofluids. Advances in Natural and Applied Sciences, 10(7 SE), 272-279.
[39] P. Ashoka Varthanan, G. Gokila Krishnan, (2018). Simulation Based Swarm Intelligence to Generate Manufacturing-distribution Plan for a Bearing Industry under Uncertain Demand and Inventory Scenario. International Journal of Pure and Applied Mathematics, 119, 2117-2134.
[40] S. Ganesh kumar, V. Thirunavukkarasu, R. Suresh Kumar (2019). Investigation of wear behavior of Silicon Carbide tool inserts and Titanium Nitride Coated tool inserts in machining of EN8 Steels. International Journal of Mechanical Engineering & Technology, 10, 1862-1873.